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M. Momin Abbas - OB-56

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## General Science Assignment 1

Q. Explain the classifications of carbohydrates, proteins, and fats with their definitions and examples.

i. **Carbohydrates:** Such nutrients which are composed of sugar, starch, and fibers are considered carbohydrates. On a chemical level, these are made by carbon, hydrogen, and oxygen. These nutrients provide energy for cells, tissues, and organs.

Grains, vegetables, milk, and pulses are common sources of carbohydrates. General formula for carbohydrate is  $C_n(H_2O)_n$ .

Carbohydrates are classified into two groups: simple and complex.

a. **Simple Carbohydrates:** These carbohydrates have lower degree of polymerization, i.e. they have fewer sugar or saccharide molecules. Often, they have lower nutritional value or calories.

They are further categorised as following:

i. **Monosaccharides** e.g., galactose, fructose, glucose, and etc. These are carbohydrate monomer.

ii. Disaccharides are made of two monosaccharides e.g., sucrose, lactose, and maltose.

iii. Oligosaccharides are made of ~~upt~~ two and more monosaccharides e.g., hexoses.

b. Complex Carbohydrates: Also known as polysaccharides, these carbohydrates have higher degree of polymerisation. It takes time to breakdown them. Usually found in lentils, potatoes, and peas.

Such polysaccharides are found as starch, glycogen, and fiber (cellulose). Starch is composed of amylose and amylopectin. Whereas, fiber is a structural component for cell wall.

ii. Proteins: These are large molecular nutrients made up of amino acids. Chemically, it is consisting carbon, hydrogen, nitrogen, oxygen, and sulphur. Such nutrients play a role in metabolism, cellular communication, and molecular recognition. Further on, it plays a significant role as hormones and enzymes.

Meat, fish, eggs, dairy products, and lentils are sources for protein.

Proteins are classified upon the formation of amino acids. Following are its classifications:

1. Primary: A sequence of amino acids
2. Secondary: Formed when amino acid sequence is shaped three-dimensionally; e.g. keratin.
3. Tertiary: More stabilised version of secondary via bonding or disulphide bridges; e.g. globulins.
4. Quarternary: It is the assembly of multiple protein structures (above); e.g., hemoglobin and insulin.

However, there is another classification of proteins which is based upon its function:

1. Enzymes: They are specialised as catalyst for digestion of foods; e.g. catalase.
2. Structural Proteins: They protect and strengthen biological structures; e.g. Keratin.
3. Carrier Proteins: They transport ions and molecules in the body; e.g., haemoglobin.
4. Nutrient and Storage: They provide nutrition and storage for ions.

iii. Lipids, Colloquially known as fats and oils, lipids are organic molecules. They are rich in energy and insoluble in water. They play an important role in formation of cell membrane.

Lipids are often found in butter, oil, cheese and etc.

Lipids are classified into three:

- i. Saturated fat: These are solid at room temperature generally found in meat, milk, and cheese.
- ii. Trans fat: These fats are those changed by hydrogenation i.e., increase in its shelf-life and hard at room temp. Found in processed food and margarine.
- iii. Unsaturated fat: Such fats are liquid at room temperature, found in oils from plants. Mono-saturated fat lowers cholesterol. Found in avocado. Poly-saturated fats are ~~also~~ found in sesame and corn oil.